SOA V-502 Dust Containment of Vacuums

1. Scope

1.1. This test method provides a laboratory test for the measurement of respirable particulate generated from the use of a vacuum cleaner.

1.2. This test method applies to all vacuums tested in the SOA program.

1.3. This test method applies to both commercial and residential vacuums.

2. Safety

2.1. This practice does not purport to address all the safety concerns, if any, associated with its use. It is the responsibility of the user of this practice to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3. References

3.1. SOA Test Carpet Specifications

4. Apparatus and Materials

4.1. Environmentally Controlled Test Chamber – with stainless steel interior, sealable door and ports with temperature and humidity maintained in standard laboratory conditions, 50% (+/- 5%) relative humidity and 70 (+/- 5) degrees

4.2. Room Air Purifier (2000 CFM with Type A HEPA filter)

4.3. Electronic Air Cleaner designed to remove airborne particles down to 0.01 microns

4.4. Real-Time Aerosol Monitor capable of measuring airborne particulate concentrations from 0.1 µg/m³ to 40 mg/ m³ with resolution to 0.1 µg/m³

4.5. Weighing scale accurate to 0.01 gram and having a capacity of at least 2000 grams

4.6. Custom soiling drum

4.7. Solid Particulate Dispenser (Stainless-steel tube-shaped dispenser with removable lid - 1.5” diameter and 1.5” length with 18 holes of 1/32” diameter evenly spaced in 2 rows of 9 holes each)

4.8. 160 Cylindrical Ceramic Mill Stones 0.5” diameter

4.9. 35 Cylindrical Ceramic Mill Stones 0.813” diameter

4.10. Reciprocating Conveyor with a bed length of 96 inches, stroke of 72 inches and bed width of 35 inches. Conveyor must be capable of maintaining specified test speed both forward and reverse. Conveyor must be equipped with brackets to hold the test equipment stationary and exert no horizontal or vertical force.

4.11. Control Vacuum – upright-type, SOA specified with HEPA filter rotating brush

4.12. Tachometer used to measure conveyor speed in feet/second

4.13. Voltage Meter Regulator

4.14. Carpet mounting platform comprised of the same material as test carpet with a 10 inch by 40 inch cut-out to be mounted on the conveyor

4.15. Tape – double sided pressure sensitive adhesive, 2.0 in. (50 mm) width
4.16. Test Room – temperature and humidity maintained in standard laboratory conditions, 50% (+/- 5%) relative humidity and 70 (+/- 5) degrees in which all conditioning and testing is performed
4.17. ISO 12103-A2 Arizona Fine Test Dust

5. Test Specimen

5.1. Test Carpet Description: Cut Pile (Residential)
5.2. Cut three test carpets (10 in. by 40 in.)
5.3. Mark the test specimens with the test identification number.
5.4. Prepare carpet for testing by clipping selvedge edge and vacuuming to remove loose fibers with the control vacuum, using 10 passes at 1.8 ft/second
5.5. Condition prepared samples in test room a minimum of 16 hours prior to soiling and no more than 72 hours.

6. Test Format

6.1. Soiling of Test Carpet
6.1.1. Fill Solid Particulate Dispenser with 5 grams of ISO 12103-A2 Arizona Fine Test Dust
6.1.2. Secure the carpet to the inside wall of the custom soiling drum (double sided tape may be used.) Rotate the drum so that the seam is located at the top of the drum.
6.1.3. Place the filled Solid Particulate Dispenser and ceramic mill stones (160 count of 0.5 inch diameter and 35 count of 0.813 inch diameter) in the drum. Spread the mill stones uniformly across the width of the carpet.
6.1.4. Start the drum and allow it to rotate for 5 minutes +/- 10 seconds at 35 RPMs.
6.1.5. Carefully remove test carpet from the drum preventing dislodging of Test Dust. Verify Solid Particulate Dispenser is empty.
6.1.6. Condition prepared samples in test room a minimum of 16 hours prior to testing and no more than 72 hours.

6.2. Condition Test Vacuum (unless previously conditioned in prior testing)
6.2.1. Energize test vacuum in a stationary position at the rated voltage +/- 1% and rated frequency with filter in place for 30 minutes.
6.2.2. If vacuum is equipped with a brush roll, the brush roll should not be engaged with the floor surface during conditioning.
6.2.3. Canister type vacuums shall be conditioned with the hose attached to the unit.
6.2.4. Condition a battery vacuum or battery attachment for 30 minutes.

6.3. Clean Carpet with Vacuum and determine respirable particulate emissions

6.3.1. Clean chamber floor with Control Vacuum and microfiber cloth and clean walls and ceiling with a microfiber cloth.

6.3.2. Mount test carpet and install vacuum.

6.3.2.1. Install new bag for vacuum or ensure canister is clean for bagless vacuums. If vacuum has a filter, install new filter.

6.3.2.2. Enter test chamber with test carpet and vacuum.

6.3.2.3. Mount test carpet sample on carpet mounting platform using double sided tape. Present test carpet with pile lay towards the vacuum.

6.3.2.4. Install vacuum on the conveyor.

6.3.2.4.1. Position vacuum on the carpet mounting platform 4-6 inches in front of the carpet test specimen.

6.3.2.4.2. Mount the vacuum unit in place on the conveyor with the handle in an inclined operating position at the vertical handle height of 31.5 inches above the test material.

6.3.2.4.3. If vacuum has adjustable height settings, then adjust height so vacuum contacts carpet surface without pressing into the pile.

6.3.2.4.4. If vacuum has multiple settings for use, refer to the COC for specific settings to be used in testing.

6.3.3. Exit test chamber.

6.3.4. Initiate the Real Time Aerosol Monitor.

6.3.5. Energize the Room Air Purifier until the established baseline of 0.0 to 1.0 µg/m³ particulate level has reached equilibrium as determined by Real Time Aerosol Monitor.

6.3.6. De-energize Room Air Purifier and Test Chamber Environmental Conditioning equipment.

6.3.7. Energize vacuum for 10 minutes +/- 5 seconds. (Conveyor is stationary during this step.)

6.3.8. Set conveyor to achieve 10 minutes +/- 5 seconds of back and forth vacuuming of the test carpet at 1.8 ft/sec and energize the conveyor.

6.3.9. After completion, de-energize the conveyor and vacuum.

6.3.10. Continue to monitor respirable particulate emissions for 4 minutes +/- 5 seconds.

6.3.11. Re-enter chamber and remove test carpet.

6.3.12. Repeat steps 6.3.1 to 6.3.11 for each test carpet.

7. Evaluation

7.1. Determine peak value of respirable particulate emissions (in µg/m³)for each test carpet from the Real Time Aerosol Monitor.

7.2. Calculate the average of all 3 test carpets.

8. Report

8.1. The identifying information for the vacuum (Manufacturer, product name and model, COC number, serial number, bag type, filter type, and description of any attachments.)
8.2. If vacuum has multiple settings (other than height), record settings during testing.
8.3. Record the date the carpet was soiled.
8.4. Record the date the carpet was cleaned.
8.5. Record the vacuum test speed and voltage.
8.6. Record peak value of respirable particulate emissions for each test carpet in µg/m³.
8.7. Record the average peak value of respirable particulate emission in µg/m³ for the set of 3 test carpets.